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ABSTRACT

The data obtained from the National Longitudinal Study of the High School Class of 1972 was used to yield estimates of the total number of instructional hours in each of the academic areas over a 3 year period. Rates of exposure to industrial arts and commercial courses exhibited large sex differences and small racial differences. Both white and female advantages in exposure were due to differences in rates at which groups initiated course taking. Program differences in academic instruction were large and varied considerably across groups. The findings concerning allocation of vocational instructional resources were that pupils enrolled in non-vocational programs received more of vocational instruction resources than students enrolled in vocational programs. Females received more vocational instruction resources than males. It appeared black pupils received more vocational resources in academic programs, but less in vocational or general curricula. High school course track membership was found to be the major factor influencing a pupil's academic preparation for subsequent schooling and employment. This study concluded profound track-induced barriers to post-secondary access are built up due to the strong variation in course exposure over tracks. This occurred regardless of the ultimate aspirations of the students. (DWH)

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Contractor Report

Curricular Resource Allocation and Course Exposure in Secondary Schools

TM 820 331

National Center for
Education Statistics

Curricular Resource Allocation and Course Exposure in Secondary Schools

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July 1980

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1. Introduction

The intent of this paper is to present in a non-technical fashion basic data concerning high school pupils' exposure to instruction in the various curricular areas. Such data are not readily available on a nationally representative basis, if the information sought is both comprehensive, i.e., covers all areas of the curriculum and the population of high school pupils, and if comparisons are to be made using characteristics of exposed pupils, e.g., race, sex, and track membership. The most recent (1972/73) national survey of course offerings and enrollments (Osterndorf, 1975; Osterndorf and Horn, 1976), for example, is complete with respect to the course exposure of those in non-vocational tracks, but omits vocational course enrollments for those in vocational tracks. In addition, no breakdowns are possible by race, sex, or track. The 1972 survey of vocational education (Osso, 1974), on the other hand, allows subdivision by pupil characteristics, but is comprehensive neither in course areas covered nor in high school enrollees. The 1977 National Survey of Science, Mathematics, and Social Studies Education (Weiss, 1978) was comprehensive in terms of high school pupils, but omitted a large portion of the curriculum.

Such data, even though difficult to obtain, are an extremely important aspect of schooling and of pupils' experiences as they participate in schooling. For school policy purposes, a pupil's instructional pursuits, however determined, are the most salient aspect of his school experience and have the most important lasting effects on his achievements, both academic and occupational. Consequently, we have taken some care in defining the indicators used here to describe those pursuits.

The data reported here were obtained from the National Longitudinal Study of the High School Class of 1972.[1] The work reported in this paper was supported by the National Center for Education Statistics in a policy-oriented analysis of these data.[2] During the base year data collection of that study, a school record information form was filled out by school officials on the pupils selected for study. A part of that form requested detailed course-taking information for the final three years of high school by curricular area from the pupil's academic record.[3] These data were transformed[4] to yield estimates of the total numbers of instructional hours in each of the academic areas over the three year period. These were then standardized to a weekly basis by dividing the product of 36 (weeks) and three (years). These numbers are the primary indicators reported in this paper. To demonstrate their direct policy importance, we have related pupils' course taking to college entrance course requirements for three selected universities (Section 4).

2. Differences in Course Exposure

The academic areas into which the pupils' pursuits were subdivided are listed on the left side of Table 1. As can be seen there, only six vocational course areas were designated, Technical Education (primarily a post-secondary area) being omitted. In what follows we assume that technical course enrollments are categorized with Trades and Industry in that occupations in these two categories are not easily distinguishable from each other, but are readily separated from the other areas. Also, it should be noted that Industrial Arts and Commercial courses are not considered to be parts of occupational or vocational curricula as they are not designed to lead to employment in specific occupations. Thus, vocational area courses have been restricted to those with the labels given in Table 1 under the heading Vocational-Technical.[5]

Table 1 Percent of Pupils Taking at Least One Course in Various Academic, Areas, by Race and Sex.

Area	White		Black	
	Male	Female	Male	Female
Academic				
Science	93.6	91.2	94.4	94.1
Foreign Language	53.7	60.1	33.5	45.5
Social Studies	98.4	98.7	97.5	97.6
English	98.3	98.6	97.5	98.2
Mathematics	91.9	87.5	91.2	91.2
Industrial Arts	47.2	7.2	43.0	8.4
Commercial	52.4	75.5	43.1	69.3
Arts	36.2	49.9	41.3	44.3
Vocational-Technical				
Agriculture	8.6	1.0	12.5	0.9
Business or Commercial	38.3	57.5	31.0	57.1
Distributive Education	4.4	5.1	5.8	6.9
Health Occupations	3.1	5.3	3.2	8.8
Home Economics	5.9	38.3	7.5	43.0
Trade or Industrial	34.0	4.7	36.8	7.2
Any Vocational Area (all)	63.7	71.8	57.8	75.7
(Not in Vocational Program)	43.3	44.8	40.3	48.2
Any Area	100.0	100.0	100.0	100.0

Table 1 gives the percentage of pupils, by race and sex, who had enrolled in at least one course in each of the curricular areas. English and Social Studies were taken by almost all pupils regardless of race or sex. Mathematics and Science were taken at uniformly high levels (in excess of 90%), except for white females who had somewhat lower exposure. Foreign Language courses were taken more often by whites and females (more than half the time), but black males had particularly low rates of exposure (34%), beginning course work at only 62 percent of the white male rate. Arts (fine and performing) courses were taken by less than fifty percent of pupils in every group, but blacks and females had generally greater exposure.

Rates of exposure to Industrial Arts and Commercial Courses exhibit large sex differences and small racial differences. Industrial Arts is taken by almost 50 percent of males, but by less than ten percent of females and commercial courses are taken by only about half of the males, but almost seventy-five percent of females. Courses formally classified as vocational-technical exhibit similar sex stereotyping. Courses relating to Business or Commercial Occupations and Home Economics being initiated predominantly by females, while Agriculture and Trade or Industrial occupations had predominantly male course taking. Distributive Education and Health occupations were more evenly split. Exposure to at least one vocational-technical course regardless of sub-area is quite high, over two-thirds of all pupils having such exposure. Male-female differences in minimal exposure are educationally significant, females having about twelve percent greater exposure than males. If we restrict our vision to those who are not enrolled in vocational-technical curricula, sex differences in exposure to such courses are greater for blacks (increasing to 20%) and smaller for whites (decreasing to 3%).

If we take a greater overview and look at average hours of total exposure to selected areas (Table 2), we also find important differences. Science and Mathematics are taken less extensively by females than males, but racial differences are not large, reflecting the above exposure differences. However, if we restrict the averaging to those who took at least one course, sex differences diminish but do not vanish, indicating that the total exposure gap between males and females is due both to lack of initial exposure to the areas and to less extensive courses taken once study was begun. Foreign language differences, both between sexes and races, almost disappear when we restrict our average total instructional hours for those who have taken at least one course. Both the white and female advantages in total exposure are almost entirely due to differences in the rates at which the groups initiate course taking, depth of exposure varying little across groups for those who begin instruction. This finding also applies to instructional exposure in Industrial Arts, Commercial instruction, Fine and Performing Arts and to Vocational-technical courses in total. Differences in these areas, especially the large sex discrepancies, diminish considerably when we remove the discrepancies in initial exposure.

Table 2 Average Hours of Instruction in Selected Academic Areas, Total and For Those Taking at Least One Course, by Race and Sex.

Area	Total Mean Hours			
	White		Black	
	Male	Female	Male	Female
Science	2.89	2.48	2.69	2.51
Foreign Language	1.36	1.63	0.86	1.14
Mathematics	2.98	2.42	2.83	2.66
Industrial Arts	1.60	0.15	1.33	0.22
Commercial	1.14	2.95	1.02	2.47
Arts	1.03	1.52	1.17	1.15
Total Vocational	2.68	3.63	3.02	4.00
	Mean Hours for Those Taking At Least One Course			
	White		Black	
	Male	Female	Male	Female
Science	3.09	2.72	2.85	2.67
Foreign Language	2.53	2.71	2.57	2.51
Mathematics	3.24	2.76	3.10	2.92
Industrial Arts	3.39	2.08	3.09	2.62
Commercial	2.18	3.91	2.37	3.56
Arts	2.85	3.05	2.83	2.60
Total Vocational	4.21	5.06	4.45	5.28

Average hours of instruction received by pupils in these four groups, for all curricular areas, totally and for each academic program[6], are given in Appendix Table D1. These data are summarized in the following tables.

Table 3. Average* Weekly Hours of Instruction in Selected Curricular Areas and Total Instructional Hours per Week by Race, Sex, and High School Track.

	Academic	General	Vocational
Science, Foreign Language, English, Mathematics			
White - Male	13.69	10.35	8.52
Female	13.05	9.49	8.16
Black - Male	13.72	10.12	9.11
Female	13.33	10.09	8.94
Social Studies			
White - Male	3.76	4.21	3.69
Female	3.70	4.03	3.58
Black - Male	3.92	4.05	3.67
Female	3.71	4.00	3.70
Art, Industrial Arts			
White - Male	1.77	3.35	3.56
Female	1.83	2.10	1.01
Black - Male	1.88	2.90	2.36
Female	1.61	1.33	1.15
Commercial			
White - Male	0.88	1.47	1.25
Female	1.46	3.01	5.52
Black - Male	1.00	1.13	0.88
Female	1.46	2.26	3.88
Total Vocational			
White - Male	1.26	2.94	5.68
Female	1.72	4.22	6.50
Black - Male	1.40	2.81	5.01
Female	2.29	3.67	6.41
Total Weekly Hours			
White - Male	21.34	22.32	22.69
Female	21.77	22.83	24.79
Black - Male	21.91	21.00	21.04
Female	22.41	21.35	24.07

*Average over the last three years of high school.

Total weekly course hours and course taking in certain selected curricular areas over the last three years of high school attendance, by track, shed light on the role of high school programs as they limit and shape pupils' academic experiences (Tabel 3). In general, we found that academic track students average fewer course hours per week than general and vocational track students; and female academic track students average the lowest number of course hours. Females in the vocational track, however, accumulate considerably more course hours than any other group. These extra hours do, however, not accumulate from course taking in the basic curricular subject matter areas. On the contrary, the hard core curricular areas -- science, foreign language, English, and mathematics together -- show fewer course hours for female high school students than for males, and within track, white females average the lowest hours in these subject matter areas. Course hours in social studies are less discrepant within track. Where then do female students accumulate more course hours? Well, females in general and vocational tracks even take less art and industrial arts courses than male students. The only course areas in which female students enroll more are commercial and vocational. Since commercial courses also have a vocational orientation, this means that females not only enroll to a higher rate in vocational programs, but in general, they take many more courses which are either vocational or have a vocational orientation. Since vocational education funds are mostly allocated on the basis of course enrollment and on the basis of vocational track or program enrollment, this might mean that females receive a higher share of vocational education funds, federal as well as state and local. However, courses mostly taken by female high school students typically require considerably less resources for equipment than courses oriented toward traditionally male occupations.

To show some of the course taking differences in greater detail, Table 4 exhibits percent differences between white males and white females, black males and black females, respectively, in total instructional hours for each curricular area, by high school program. In the academic course areas, differences in sex and race groups are generally duplicated across the programs, however, blacks in academic curricula are much closer to white males in foreign language exposure and blacks in vocational curricula generally have greater amounts of instruction in mathematics and science than white males.

If we focus on Art, Vocational-Technical, and related courses, we see some important differences among curricula: sex differences are generally sharper in the vocational programs and black males in academic curricula differ less than in other curricula from white males in course exposure averages.

Table 5 focusses directly on these program differences by contrasting vocational and academic program exposure means for each sex/race group separately. Extreme values index course areas in which there are large discrepancies between pupils in vocational versus academic programs. The largest discrepancies are for foreign languages, in which academic pupils take considerably more work and for Trade and Industrial occupations and Distributive Education which are primarily taken by vocational pupils. Program separation, although not as extreme, is also large for Agriculture (males only), Industrial Arts (males only), Home Economics and Business and Commercial (females only). Health occupations exhibits an unusual pattern of program separation, being more heavily vocational for black males and white females, but more strongly academic for white males and black females.

Table 4. Discrepancy in Course Hours: Blacks and Females Compared to White Males, by High School Program.

Area	General			Academic			Vocational		
	White Female	Black Male	Black Female	White Female	Black Male	Black Female	White Female	Black Male	Black Female
Science	- 13.6	0.0	- 8.2	- 14.3	- 2.5	- 10.0	- 15.2	+ 17.7	+ 6.1
Foreign Language	+ 12.2	- 32.9	- 12.2	+ 20.0	- 4.2	+ 8.8	+ 20.0	- 16.7	+ 83.3
Social Studies	- 4.3	- 3.8	- 5.0	- 1.6	+ 4.3	- 1.3	- 3.0	- 6.5	+ 0.3
English	- 1.5	- 1.3	+ 1.3	0.0	+ 6.0	+ 2.1	- 0.5	+ 0.2	+ 0.7
Mathematics	- 21.8	+ 3.9	- 0.8	- 15.4	- 1.4	- 7.7	- 19.6	+ 13.7	+ 1.0
Industrial Arts	- 89.7	- 18.6	- 87.1	- 85.0	- 5.0	- 72.5	- 94.6	- 52.5	- 92.9
Commercial	+104.8	- 23.1	+ 53.7	+ 65.9	+13.6	+ 65.9	+ 341 6	- 29.6	+ 210.4
Arts	+ 34.8	- 6.4	- 23.4	+ 76.3	+15.5	+ 43.3	+ 44.1	+ 61.0	+ 59.3
Agriculture	- 88.6	+ 28.6	- 91.4	- 90.0	+60.0	- 100.0	- 98.6	- 7.0	- 100.0
Business	+119.8	- 17.0	+ 60.4	+ 64.1	+12.5	+ 90.6	+ 395.8	- 34.7	+ 306.3
Distributive Education	+ 40.0	+ 40.0	+ 90.0	- 33.3	-67.7	- 67.7	- 20.0	+ 5.7	+ 25.7
Health Occupations	+100.0	+200.0	+350.0	+ 60.0	-20.0	+ 580.0	+ 366.7	+100.0	+ 800.0
Home Economics	+788.2	0.0	+758.8	+1200.0	+50.0	+1525.0	+1442.9	+228.6	+1571.4
Trade or Industrial	- 88.5	- 13.9	- 91.0	- 92.7	+ 2.4	- 82.9	- 92.2	- 14.2	- 81.3

Table 5 Discrepancy in Instructional Hours Between Vocational and Academic Programs as a Percent of Vocational Program Hours.

Area	White Male	White Female	Black Male	Black Female
Science*	-44.5	-45.1	-33.0	-34.5
Foreign Language*	-86.0	-74.4	-87.9	-76.6
Social Studies*	- 1.9	- 3.2	- 6.4	- 0.3
English*	- 3.0	- 3.5	- 8.3	- 4.3
Mathematics*	-44.0	-46.8	-35.4	-34.0
Industrial Arts	-73.1	-25.0	-46.1	+ 4.8
Commercial	-29.6	-73.6	+13.6	-62.4
Arts*	-39.2	-50.3	-15.2	-32.4
Agriculture	-85.9	0.0	-75.8	0.0
Business	-32.6	-77.7	+16.1	-68.4
Distributive Education	-91.4	-92.9	-97.3	-97.7
Health Occupations	+66.7	-42.9	-33.3	+25.9
Home Economics	-42.9	-51.9	-73.9	-44.4
Trade or Industrial	-88.5	-89.3	-86.3	-89.6

*For these subject areas academic program hours is the base for the percentage.

These curricular differences can be summarized and highlighted by graphical displays (Figures 1 and 2). We have plotted the total hours of Vocational and Academic (Total minus Vocational) Instruction as a two-dimensional graph: abscissa values equalling the vocational hours and ordinate values equalling the academic hours. The points plotted are the pairs of values for twelve combinations of programs (academic, general, vocational), race (black, white), and

Figure 1 Hours of Academic and Vocational Instruction, by High School Program, Race and Sex, Version A.

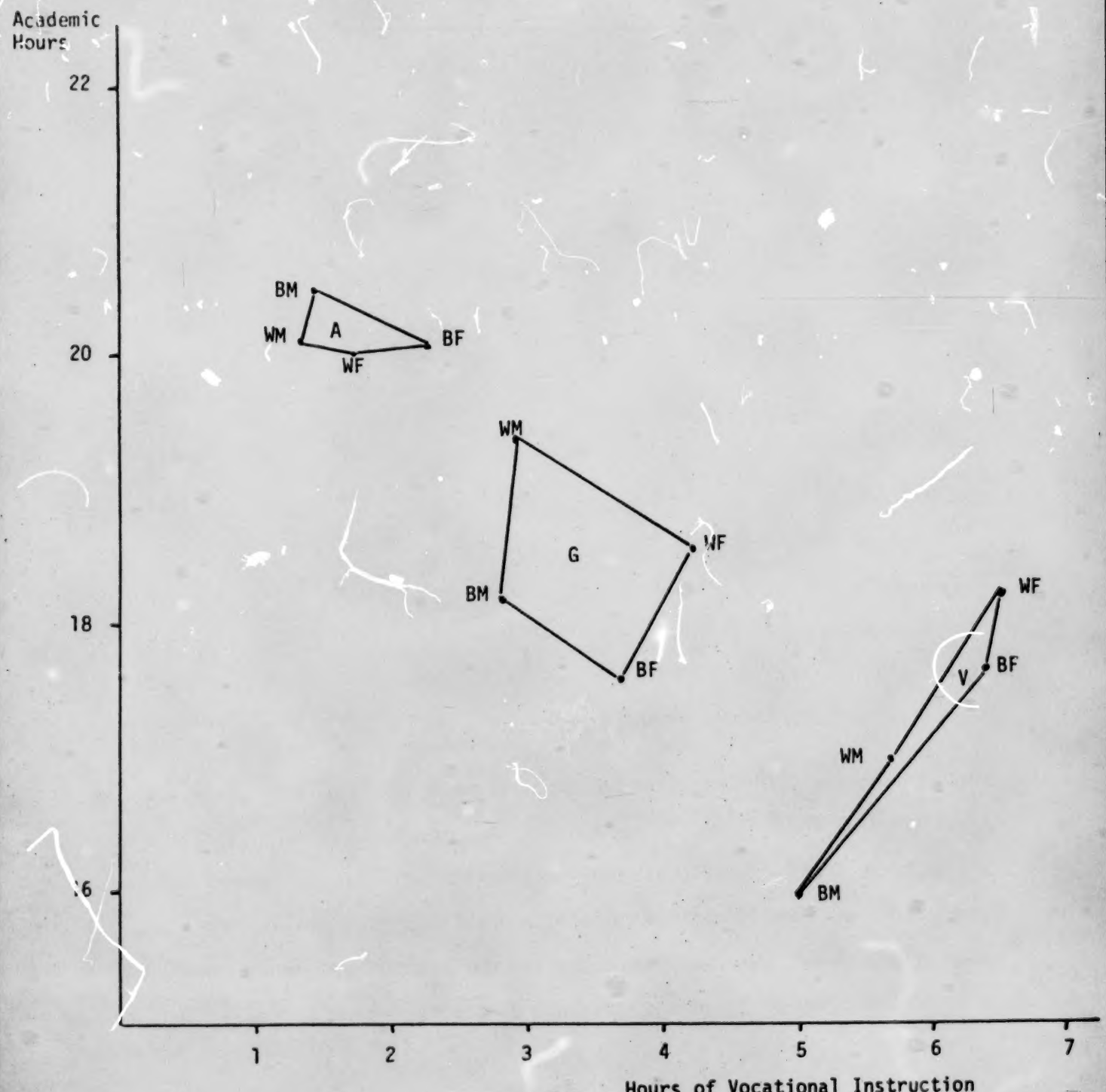
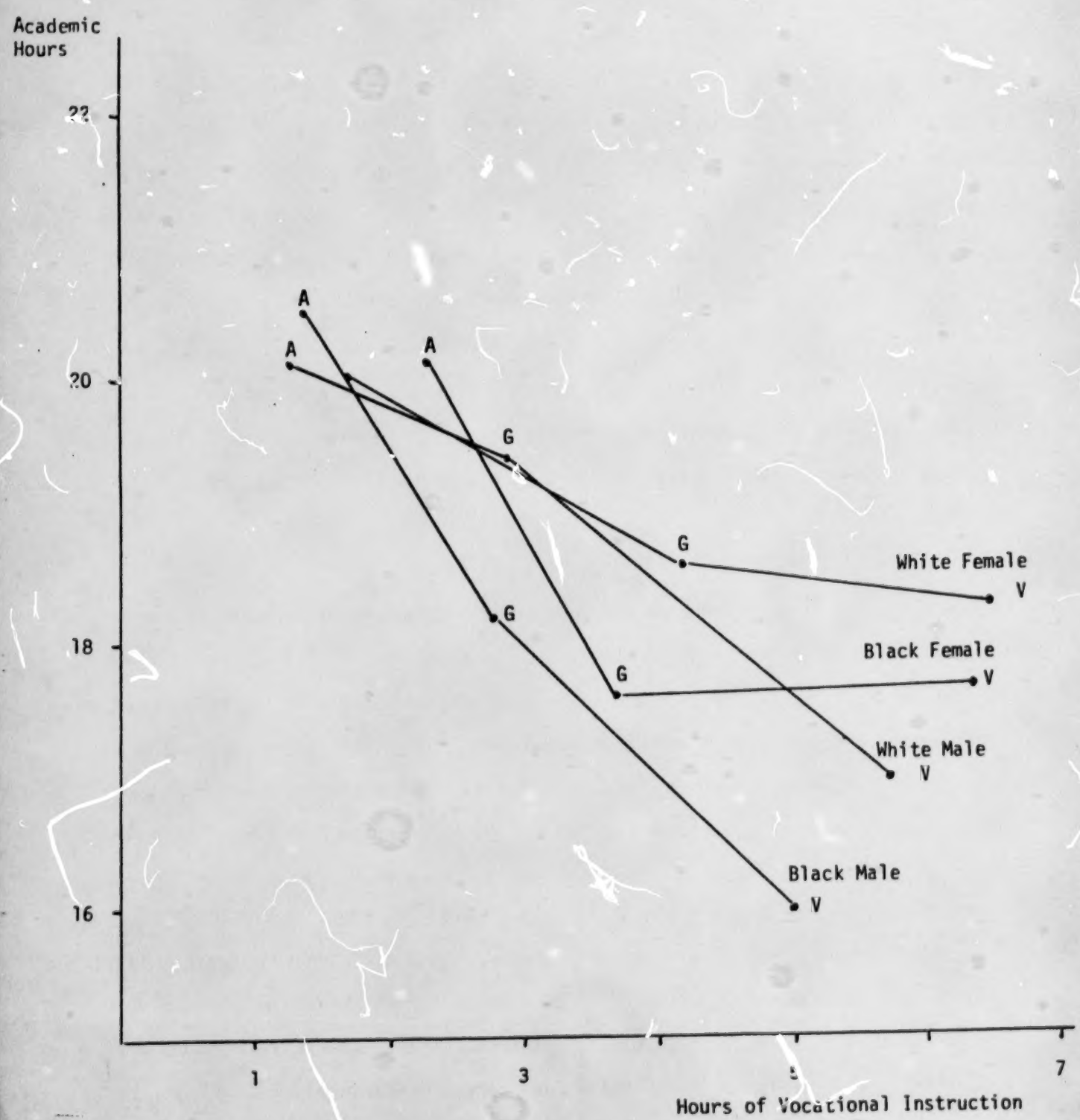


Figure 2 Hours of Academic and Vocational Instruction, by High School Program, Race and Sex, Version B.



sex (male, female). The alternative versions are graphed with race/sex groups linearly connected for each program (A) and the programs connected for each race/sex group (B). The first graph (A) clearly shows the program separations: None of the program figures are even remotely close to another. As one might expect, the hours of academic and vocational instruction are negatively related over programs, but not so across groups within programs. These negative relations are strongest for males, with females in academic and general curricula taking approximately equal amounts of academic instruction (B). In terms of total instruction, blacks are highest in the academic program, while whites are highest in the general. Within the vocational program, there is generally a positive relation of academic to vocational hours, white females ranking highest in both academic and vocational, followed by black females, white males and black males.

In summary, academic instruction averages about eighteen hours per week in the last three years of high school, but blacks lag about four to five percent behind whites, perhaps as much as an hour. Social background has very little effect on current academic instruction independent of program. That is, social background has its primary effect on hours of academic instruction via the process by which pupils are selected for particular high school tracks. Program differences (Academic minus Vocational, see Table 6) range from two to three hours (12 to 18% of the vocational means), but are greatest for black males (4½ hours or 29% of the vocational mean). In standard deviation terms, these differences average about 40 percent, but are only 25 percent of that value for white females and are 75 percent for black males. Thus, program differences in academic instruction are very large, especially for black males, and vary considerably across groups.

Table 6 Academic/Vocational Program Contrasts* in Hours Per Week of Work, Academic and Vocational Training, by Race and Sex.

	White Male	White Female	Black Male	Black Female
Academic Hours				
Raw Contrast (Hours)	2.91	1.67	4.58	2.37
Standard Deviation (Hours)	6.63	6.61	6.14	6.59
Percent Contrast (% of SD)	43.9	25.3	74.6	36.0
Percent of Vocational Mean	17.7	9.5	28.9	13.9
Vocational Hours				
Raw Contrast (Hours)	- 4.42	- 4.78	- 3.61	- 4.12
Standard Deviation	3.21	3.71	3.14	3.75
Percent Contrast (% of SD)	-137.7	-128.8	-115.0	-109.9
Percent of Vocational Mean	- 77.8	- 73.5	- 72.1	- 64.3
Percent in Excess of White Males				
Academic Hours	0	0.2	- 3.9	- 5.1
Vocational Hours	0	20.5	12.7	37.3

*Academic Hours - Vocational Hours/Total Standard Deviation.

The difference for black males is worth emphasizing. They are greatly separated in amount of academic training depending on whether they are in the academic or vocational track. The reason for this is that they are exposed to more academic course work than white males if they are in the academic program. On the other hand the white females are not widely separated in the amount of academic course work by program participation. This occurs primarily because they receive more academic exposure than white males when they are in a vocational program.

Vocational Instruction averages about three hours per week in the last three years of high school. Overall, black males generally get more vocational training than white males (+13%), but less if they are in the general (-4%) or vocational (-12%) programs. They are exposed to more vocational instruction than white males (+11%) if they are in the academic program. Thus, the primary reason for their greater amount of vocational instruction is the fact that they are proportionately more often than whites selected for vocational curricula. The females get more vocational instruction regardless of programs. But the largest differences, both racial and between the sexes, are in the academic program and the smallest are in the vocational.

3. The Allocation of Instructional Resources: Vocational Education

The patterns of experience which we have just discussed can be expressed from an alternative viewpoint. As we have chosen to develop them, and they are represented by averages of indices of pupil experience, and are most meaningful from the prospective of the pupil. From the perspective of the educational instruction providing services which contribute to those experiences, however, these averages do not correspond to the efforts expended nor to their distribution over relevant groups of pupils.

For example, suppose that pupils in vocational programs constituted 24 percent of all pupils and, therefore, pupils in non-vocational programs (academic, general) constituted 76 percent of all pupils. Suppose also that pupils in vocational programs received about 6.1 hours per week of vocational instruction, while pupils in non-vocational programs received only 2.6 hours of vocational instruction. Then, the total proportion of the instructional hours expended by the schools which went to vocational-program pupils would be:

$$\frac{(6.1)(.24)}{(6.1)(.24) + (2.6)(.76)} \cong 0.43$$

i.e., even though the rate of service received by vocational pupils was over twice the rate of receipt by non-vocational pupils [(6.1)/(2.6) $\cong$ 2.4], the fact that non-vocational pupils constituted more than three-fourths of the total population implied that they -- as a group -- received well over half (57%) of the instruction conveyed.

This result is, in fact, approximately correct. We have simplified the computation so that the concept is made clear and consequently the figures have been severely rounded. Below, we carry out these computations more accurately for a more finely segmented set of pupil sub-groupings. These sub-groupings are defined by the racial/ethnic group; sex, and curricular program of the pupil. And in order to accomplish the complete accounting of vocational instructional services delivered, we must expand our scope to include all pupils, not just whites and blacks.

Table 7 exhibits the total vocational hours of instruction for which pupils were registered over the last three years of high school. As before, these hours are expressed on a per week basis. Vocational pupils, in total, average -- as we indicated above -- about 6.1 hours per week. Pupils in the general program average about 3.5 hours and academic pupils about 1.9 hours. Blacks average about 3.6 hours, over-all programs, and whites about 3.2 hours. Females average 3.7 hours and males average 2.8 hours, a twenty-five percent difference. Table 8 displays the percentage of the total pupil population on which these means are based.

Table 7 Mean Hours of Vocational Instruction, by Racial/Ethnic Group, Sex, and High School Program.

Subgroups	Program			
	General	Academic	Vocational	Total (All Programs)
Males				
White	2.94	1.26	5.68	2.68
Black	2.81	1.40	5.01	3.02
Other	3.54	1.41	5.69	3.37
Total (All Males)	2.98	1.34	5.62	2.76
Females				
White	4.22	1.72	6.50	3.63
Black	3.67	2.29	6.41	4.00
Other	4.05	2.14	6.68	4.11
Total (All Females)	4.11	1.79	6.50	3.70
Total				
White	3.51	1.46	6.14	3.15
Black	3.29	1.92	5.80	3.58
Other	3.81	1.45	6.14	3.72
Total (All Subgroups)	3.51	1.93	6.11	3.23 (All Pupils)

Table 8 Percent Population Distribution, Over Racial/Ethnic, Sex, and High School Program Groups for Pupils with Complete Information on High School Programs and Course-Taking.

Sub-Group	Program			
	General	Academic	Vocational	Total
Males				
White	12.9	20.5	8.7	42.1
Black	1.8	1.0	1.0	3.8
Other	1.4	1.5	1.2	4.1
Total	16.1	23.0	10.9	50.0
Females				
White	10.5	19.8	11.0	41.3
Black	2.3	1.4	1.3	5.0
Other	1.6	1.1	1.0	3.7
Total	14.4	22.3	13.3	50.0
Total				
White	23.4	40.3	19.7	83.4
Black	4.1	2.4	2.3	8.8
Other	3.0	2.6	2.2	7.8
Total	30.5	45.3	24.2	100.0

The final allocations of the vocational instructional services in percentage terms, are given in Table 9. This table was derived from the figures given in Tables 7 and 8 by using the computational logic discussed above. The figures, therefore, represent the percentages of the total instructional resources -- as they result in actual hours of vocational instruction allocated to pupils in various racial/ethnic, sex, and program groups. The figures in this table, in contrast to earlier tables of mean hours, actually sum to 100 percent and the marginal sums represent estimates of the resources allocated to the aggregate groups represented in that marginal classification.

Table 9 Percent of Vocational Instructional Resources Allocated to Various Racial/Ethnic, Sex and High School Program Groups.

Sub-Group	Program			
	General	Academic	Vocational	Total
Males				
White	11.70	7.97	15.30	34.97
Black	1.56	0.42	1.53	3.51
Other	1.53	0.64	2.10	4.27
Total	14.79	9.03	18.93	42.75
Females				
White	13.71	10.52	22.06	46.29
Black	2.58	0.99	2.63	6.20
Other	1.99	0.72	2.06	4.77
Total	18.28	12.23	26.75	57.26
Total				
White	25.41	18.49	37.36	81.26
Black	4.14	1.41	4.16	9.17
Other	3.52	1.36	4.16	9.04
Total	33.07	21.26	45.68	100.00

We first note a confirmation of our earlier, rough, result: Vocational pupils receive less than 50 percent of the resources devoted to vocational instruction (46%). And of the 54 percent allocated to pupils not in vocational programs, two-thirds go to pupils in the general curriculum (33%) and one-third to those enrolled in academic programs (21%). We also see that 81 percent of the resources go to white pupils, 10 percent to blacks, and 9 percent to those in other racial/ethnic groups. This is roughly equivalent to the total population percentages of 83, 9, and 8 percent, respectively. (See below, Table 11 for a more precise comparison.) Females receive 57 percent of these allocated resources as opposed to 43 percent for males.

For this specific population the corresponding percentages are: white - 81 percent, black - 10 percent, other - 9 percent; female - 55 percent, male - 45 percent (see Table 12 below). Also, of the resources allocated to black pupils (9.7 percent of the total), even a smaller portion (43 percent) are allocated to those in vocational programs.

We now turn our attention specifically to a comparison of the resources allocated to a sub-group and the proportion of the population in that sub-group. Table 10 displays the percent differences between the resources allocated and the population proportion in each category, thus displaying the resource allocation against an expectation based on an equal allocation to each individual.[7] Here we see the resource targeting in sharp contrast: Vocational pupils receive 89 percent more vocational resources than they would under an artificial expectation of proportionate allocations over high school programs. Pupils in the general program receive 8 percent more and those in academic programs 53 percent less than that expectation. Females receive about 15 percent fewer resources than under proportionate allocation. Whites receive about three percent fewer resources and black and other racial/ethnic groups receive 10 and 16 percent more, respectively.

Table 10 Percent Discrepancy: Total Vocational Instructional Resources Allocated Versus Proportion of Pupils, by Racial/Ethnic, Sex and High School Program Group.

Sub-Group	Program			
	General	Academic	Vocational	Total
Males				
White	- 9.3	-61.1	+ 75.9	-16.9
Black	-13.3	-58.0	+ 53.0	- 7.6
Other	+ 9.3	-57.3	+ 75.0	- 4.0
Total	- 8.1	-60.7	+ 73.7	-14.5
Females				
White	+30.6	-46.9	+100.6	+12.1
Black	+12.2	-29.3	+102.3	+24.0
Other	+24.4	-34.6	+106.0	+28.9
Total	+26.9	-45.2	+101.1	+14.5
Total				
White	+ 8.6	-54.1	+ 89.6	- 2.6
Black	+ 1.0	-41.3	+ 80.9	+10.3
Other	+17.3	-47.7	+ 89.1	+15.9
Total	+ 8.4	-53.1	+ 88.8	0.0

Table 11 Percent of Vocational Instructional Resources Allocated to Various Racial/Ethnic and Sex Groups, by High School Program.

	Program			
Sub-Group	General	Academic	Vocational	Total
Males				
White	35.38	37.49	33.49	34.97
Black	4.72	1.98	3.35	3.51
Other	4.63	3.01	4.60	4.27
Total	44.72	42.47	41.44	42.75
Females				
White	41.46	49.48	48.29	46.29
Black	7.80	4.66	5.76	6.20
Other	6.02	3.39	4.51	4.77
Total	55.28	57.53	58.56	57.26
Total				
White	76.84	86.97	81.79	81.26
Black	12.52	6.63	9.11	9.71
Other	10.64	6.40	9.11	9.04
Total	100.00	100.00	100.00	100.00

Table 12 Percent Population Distribution Over Racial/Ethnic and Sex Groups, by High School Program.

Sub-Group	Program			
	General	Academic	Vocational	Total
Males				
White	42.3	45.3	36.0	42.1
Black	5.9	2.2	4.1	3.8
Other	4.6	3.3	5.0	4.1
Total	52.8	50.8	45.0	50.0
Females				
White	34.4	43.7	45.5	41.3
Black	7.5	3.1	5.4	5.0
Other	5.3	2.4	4.1	3.7
Total	47.2	49.2	55.0	50.0
Total				
White	76.7	89.0	81.4	83.4
Black	13.4	5.3	9.5	8.8
Other	9.8	5.7	9.1	7.8
Total	100.0	100.0	100.0	100.0

The allocation comparisons we have been discussing have been primarily influenced by differences among programs, either in the general amount of resoures allocated or in the expectations with which we compared them. Thus, when we found that over fifty percent of the vocational instructional revenues were allocated to non-vocational pupils, we implicitly compared that to a value based on the expectation that all or the vast majority of vocational education resoures should flow to those enrolled in vocational programs. However, when we made the comparisons of sex and racial/ethnic groups based on Table 10, we posited equal allocations to individuals as the expectational base. In actual fact, however, we would not expect that allocations should flow equally to sex and racial/ethnic groups, because they are unevenly distributed over high school programs and we do not expect that vocational resources should be distributed proportionately over programs even if pupils were so distributed. Surely under any reasonable expectation, vocational students should have a higher rate of exposure to such resources than non-vocational students. One useful way to handle this problem is to examine resource allocation within programs. This does not address the issue of allocation by program enrollment category, but that issue has already been adequately handled by the initial results.

Table 11 displays proportional resource allocations to racial/ethnic and sex groups by high school program. This table was produced by column-standardizing Table 9. Table 12 was produced in a corresponding fashion from Table 8, yielding the percentage composition of each program group, separately.

Given these data, we may then compare the two tables and estimate program-specific discrepancies (Table 13). Here we see the implications of the resource

Table 13 Percent Discrepancy: Vocational Instructional Resources Allocated Versus Proportion of Pupils, by Racial/Ethnic and Sex Group, for Each High School Program.

	Program			
Sub-Group	General	Academic	Vocational	Total
Males				
White	-16.4	-17.2	- 7.0	-16.9
Black	-20.0	-10.0	-18.3	- 7.6
Other	+ 1.0	- 8.9	- 8.0	- 4.0
Total	-15.3	-16.4	- 7.9	-14.5
Females				
White	+20.9	+13.2	+ 8.3	+12.1
Black	+ 4.0	+50.3	+ 6.7	+24.0
Other	+13.6	+51.3	+10.0	+28.9
Total	+17.1	+16.3	+ 6.5	+14.5
Total				
White	+ 0.1	- 2.3	+ 0.5	- 2.6
Black	- 6.6	+25.1	- 4.1	+10.3
Other	+ 8.6	+12.3	+ 0.1	+15.9
Total	0.0	0.0	0.0	+ 0.0

allocations much more clearly. In addition to being more often assigned to vocational programs than males, females in any specific program are allocated proportionately more vocational resources than the males in the same program. Thus females are allocated additional vocational instructional resources via both program selection and course enrollment. Interestingly, however, the within-program resource allocations are more sex related in the general

curriculum and in the academic curriculum than in vocational programs. In the non-vocational programs females receive 16 or 17 percent more resources than expectations based on proportionate allocations, while in vocational programs this discrepancy is only 7 or 8 percent.

Black pupils, on the other hand, receive quite different resource allocations depending on the program in which they are enrolled. Blacks in the academic curriculum receive proportionately more vocational resources than the other groups. However, in the general program they receive less, although the discrepancies are smaller. Blacks also receive fewer resources, relatively, if they are enrolled in vocational programs, although here the discrepancies are the smallest, paralleling the results for females.

To summarize, there are three main findings concerning the allocation of vocational instructional resources:

1. Pupils enrolled in non-vocational programs receive more of the resources devoted to vocational instruction than do pupils enrolled in vocational programs. Surely, if the major intent of vocational education is, as is most often asserted, to prepare pupils for particular post-high school occupations and jobs, the fact that the majority of such resources do not flow to pupils enrolled in programs with these specific goals is worthy explicit discussion during the process of allocation of future resources to vocational education. This issue is especially salient during a period of political debate over alternate ways of handling the high rate of unemployment among youth. If vocational education is a tool for reducing youth unemployment, we should be extremely confident that additional resources allocated to such occupationally-oriented programs are not diffused to

youth who do not encounter unemployment problems either because they already have relevant job skills or because they go on to academic post-secondary education. And we should be doubly sure that the resources are allocated with sufficient intensity and depth to specific individuals so they are actually prepared to successfully enter the occupation for which they were trained.

2. Females received proportionately more vocational resources devoted to instruction than males. This conclusion should be treated with somewhat more caution than the first. Data displayed in Appendix D indicates that the differential in mean vocational course exposure by sex could be attributed solely to courses in Home Economics. As there is some ambiguity in the occupational nature of the courses in this area and as the 1972 data collection did not attempt to differentiate between the occupational and the personal nature of these courses, we are left with an ambigious result.

3. In academic programs, black pupils receive more vocational resources than others, while in vocational or general curricula blacks receive less than non-blacks. This finding essentially reinstates that of the earlier section dealing with exposure. This result is less tenuous than the one for females (2), however, because it is paralleled in both male and female course exposure and resource allocation data.

4. College Entrance Course Requirements: An Integration of Instructional Exposure

Colleges and universities place restrictions on the academic backgrounds of the high school students who would matriculate to them. And these requirements vary considerably from one post-secondary institution to another. We have selected three such universities as graded examples of such entrance requirements. To accomplish this we arranged the specific course requirements outlined by three college catalogues: Those of Harvard, Northern Michigan University and Purdue. Appendix C gives these requirements in detail and describes their interrelations.

We coded each pupil's academic record according to whether he or she met the course requirements of each institution. Table 14 summarizes the general results. There we see that Harvard accepts as qualified only five percent of all high school seniors. Northern Michigan and Purdue, on the other hand, would accept the high school course work of 19 and 47 percent respectively. Comparatively, blacks are more greatly disadvantaged with respect to admission to the institutions with more stringent requirements, perhaps because of the generally lower rate at which they take Foreign Language training. Females, on the other hand, are advantaged relative to males using Harvard standards, but are disadvantaged at the less stringent institutions. This is most likely because females take more Foreign Language but less mathematics and science.

Table 14 Rates at Which High School Students of Different Race and Sex Groups Met Course Requirements for Admission to Three Universities.

	Race			
Sex	White	Black	Other	Total
Male				
Harvard	5.16	2.25	3.08	4.78
Northern Michigan	26.45	17.29	17.42	25.04
Purdue	53.57	46.91	41.26	52.08
Female				
Harvard	5.73	3.13	4.09	5.36
Northern Michigan	15.88	13.68	9.98	15.24
Purdue	42.16	43.55	30.33	41.43
Total				
Harvard	5.44	2.75	3.58	5.07
Northern Michigan	21.20	15.23	13.97	19.08
Purdue	47.90	45.00	36.29	46.76

If we examine the curricular differences (Table 15), we find striking results. The overwhelming controlling factor on college admission requirements is high school program. There are some race and sex differences, but these are much smaller than the program differences and tend to parallel those discussed above.

No blacks in vocational programs meet the requirements for Harvard. Less than one percent of whites in such programs meet those requirements. On the other hand, about 10 percent of pupils in academic programs meet them and this percentage does not vary significantly by race. Similar differences exist for the other two universities and again there are no important racial differences. It seems that accounting for high school program removes all racial effects in access to university-level education. There are significant sex differentials within programs, but these are as above: advantages to females for entry to Harvard, disadvantages for entry to Northern Michigan and Purdue.

Table 15 Rates of Satisfaction of Colleges Entrance Requirements, by Program, Race and Sex.

	White		Black	
Institution/Program	Male	Female	Male	Female
Harvard				
General	1.43	0.52	0.18	0.37
Academic	9.41	11.64	8.14	10.19
Vocational	0.14	0.50	0.00	0.00
Northern Michigan				
General	12.12	5.38	11.12	7.03
Academic	43.40	28.97	42.41	33.93
Vocational	6.44	2.21	4.01	2.77
Purdue				
General	41.55	28.05	41.05	40.73
Academic	70.93	63.26	71.10	64.67
Vocational	29.68	17.40	31.65	24.85

The primary insight to be gained of the figures reported here is that track membership is the major factor influencing a pupil's academic preparation for subsequent schooling and, consequently, for employment. Previous studies have documented the effects of track on educational and occupational aspirations. And other studies have shown its strong effects on participation in post-secondary education; but the extent to which the latter effects are directly attributable to differences in aspirations has been obscure. Out study has clarified this issue. Given the strong variation in course exposure over tracks, especially as summarized by the powerful differences in the satisfaction of college entry course requirements, we see that over the course of secondary schooling, profound track-induced barriers to post-secondary access are build up, regardless of the ultimate aspirations of the pupils.

Footnotes

1. The original study was initiated and carried out by the National Center for Education Statistics, U.S. Department of Health, Education, and Welfare. That study was conceived as a survey of a representative, national sample of high school seniors and their schools, using questionnaires which were completed by the seniors at their schools during Spring 1972, and simultaneously by school officials. Questions directed at the pupils focussed on their backgrounds, experiences, attitudes and plans; ability tests were also administered to them. Questions directed at school officials were attempts at characterizing the school's programs and facilities and also information from the school's records about the individual pupils who were tested and responded to the questionnaires.

   The population which the study attempted to sample was all twelfth graders enrolled during 1972 in all public and private schools in the 50 states and the District of Columbia. The initial sample survey has been followed up by four additional surveys of the originally sampled individuals and of a specially selected suplemental sample designed to compensate for defects found in the original sampling frame and in the implementation of the original survey. The primary sample originally consisted of 1,200 schools and was targeted to a maximum of 18 pupils per school. In actuality, 1,044 schools and 17,726 pupils participated of whom 16,683 completed the questionnaire. The supplementary sample consisted of 257 additional schools and 4,450 additional pupils. First follow up (October, 1973) questionnaires were sent to 23,654 individuals and were completed by 21,350. The second (October, 1974) and third follow up (October, 1976) questionnairs were completed by 20,872 and 20,194 individuals respectively. These questionnaires focussed on the living conditions, work experiences, education and training, military service, family status, life experiences and opinions of these individuals. The data reported in this document were collected in the base year and the 1976 follow up. The fourth follow up survey had not been completed when this study was initiated.

2. Contract Number 300-78-0546. Wiley, D.E. and Harnischfeger, A. High School Learning, Vocational Tracking, and What Then? Evanston: CEMREL, 1980.

3. See Appendix A for the form.

4. See Appendix B for a description of the algorithm used.

5. See Appendix A.

6. The information concerning students' track membership was taken from questionnaires responded to by the school administration.

7. These figures were derived by taking ratios of the entries in Tables 8 and 9.

References

Osso, N. A. — Vocational Education, Characteristics of Students and Staff, 1972. Washington, DC: U.S. Government Printing Office, 1974.

Osterndorf, L — Summary of Offerings and Enrollments in Public Secondary Schools, 1972-73. Washington, DC: U.S. Government Printing Office, 1975.

Osterndorf, L. and Horn, P. J. — Course Offerings, Enrollments, and Curriculum Practices in Public Secondary Schools, 1972-73. Washington, DC: U.S. Government Printing Office, 1976.

Weiss, I. R. — Report of the 1977 National Survey of Science, Mathematics, and Social Studies Education. Washington, DC: U.S. Government Printing Office, 1978.

APPENDIX A

4. How many semester courses will the student have taken in each of the following subjects between July 1, 1969, and the date he or she graduates? How many class periods per week did these courses meet?

EXAMPLE: If a student took six semester courses in science, and four of these courses met five class periods per week whereas two courses met only three class periods per week, you would enter "6" for the *Total number of semesters of instruction* and "4" and "2", respectively, in the "5" and "3" columns under *Number of class periods per week.*

Type of course	Total number of semesters of instruction ▼	Number of class periods per week						
		1	2	3	4	5	More than 5	
Science								(1)
Foreign languages								(2)
Social studies								(3)
English								(4)
Mathematics								(5)
Industrial arts								(6)
Commercial								(7)
Fine arts or performing arts								(8)

5. Please indicate the total number of semester courses this student will have taken in each of the following vocational-technical subjects by the time he or she graduates. For each subject in which the student has taken courses, please indicate in the appropriate class-periods-per-week columns the number of courses taken before July 1, 1969, and after July 1, 1969.

Type of vocational-technical course	Total number of semesters of instruction ▼	Before July 1, 1969 — Number of class periods per week						After July 1, 1969 — Number of class periods per week						
		1	2	3	4	5	More than 5	1	2	3	4	5	More than 5	
Agricultural														(1)
Business or commercial														(2)
Distributive education														(3)
Health occupations														(4)
Home economics														(5)
Trade or industrial occupations														(6)

APPENDIX B

Variables for foreign language, social studies, English, mathematics, industrial arts, commercial, and fine arts were defined in the same way.

For the course-taking categories listed under question SRFQ5 of the Student Record Information Form, periods per week, courses and minutes were defined in the same way as above, for each of the "before July 1, 1969" and "after July 1, 1969" categories. The check field compares the coded total number of semesters with the sum of all counts across both time periods. These variables are defined for agriculture, business, distributive education, health occupations, home economics and trade occupations.

The variables "total periods academic" and "total minutes academic" are sums of the corresponding variables for science, foreign languages, social studies, English, mathematics, and fine arts. Missing data on any of these component variables caused the sum to be defined as missing.

The variables "total periods vocational" and "total minutes vocational" are sums of the corresponding variables for agriculture, business or commercial, distributive education, health occupations, home economics, and trade industrial occupations. Only courses taken after July 1, 1969 are included in these totals. Missing data codes propagated as for other variables.

An additional pair of variables representing total periods and total minutes vocational were defined in the same way, except that minutes and periods for commercial courses (under SRFQ4) were included if and only if total periods

File Narrative: Description of Derived Variables

Total periods/week of Science. This is sum of one times semester courses of science meeting once a week plus two times semester courses meeting twice a week plus three times semester courses meeting three times a week, etc. It is constructed from responses to question SRFQ4. Missing data on any field was propagated to a missing code for the derived variable. The "more than five" column was weighted six.

Total courses in Science. This is the unweighted sum of courses taken, ignoring number of class periods per week. Missing data codes were propagated as for the total periods/week variable.

Total minutes of Science. Computed using SCHQ05 (number of weeks in the school year) and SCHQ06 (Number of minutes in standard class periods), along with total periods/week variable defined above: Total minutes = SCHQ06 x SCHQ05 x (Total periods/week)/2. The division by two is a conversion from semesters to years. Missing data codes on any constituent variables were propagated.

The fourth created variable is a check comparing the "total number of semesters of instruction" from SRFQ4 to the sum of the courses in each category of number of class periods per week.

of business or commercial (SRFQ5) was zero, and minutes and periods for industrial arts (SRFQ4) were included if and only if total periods of trade or industrial occupations (SRFQ5) was zero. Missing data propagated as elsewhere.

The detailed group code was used to create a series of indicators of decreasing confidence in the data, as shown in the layout for columns 9263 through 9267. Data for which Groupl is 1 are most reliable, a somewhat more inclusive set is coded 1 for Group2, etc. The detailed group code (column 9262) was defined as follows:

1. Compute an estimate of number of periods per day, NPPD, as number of periods vocational plus number of periods academic, divided by 30 and rounded to the nearest whole number. Total periods vocational from columns 9242 - 9245 is used in this calculation. The constant 30 represents 3 years times 2 semesters per year times 5 days per week. If this variable cannot be formed due to missing data, set group code to 0.

2. Compute double counting indicators for commercial and industrial arts, IDCC and IDCIA, using the corresponding "total courses" fields from questions SRFQ4 and SRFQ5. These indicators are set equal to 0 if one or both fields are either missing or zero, 1 if they are non-zero and equal, and 2 if they are both non-zero but not equal.

3. Compute the detailed group code, IG, using NPPD, IDCC, IDCIA, total periods vocational from columns 9252 - 9255 (NPVOCA) and total periods academic (NPAD), as follows:

   If NPVOCA $\leq$ 20 and NPAC >0 and 3 $\leq$ NPPD $\leq$ 9, let IG = 1

   If NPVOCA $\leq$ 20 and NPAC >0 and NPPD = 2, let IG = 2

   If NPVOCA > 20 and 3 $\leq$ NPPD $\leq$ 5 and IDCC = 0 and IDCIA = 0, let IG = 3

   If NPVOCA > 20 and 3 $\leq$ NPPD $\leq$ 5 and (IDCC = 1 or IDCIA = 1), let IG = 5

   If NPVOCA > 20 and 3 $\leq$ NPPD $\leq$ 5 and IG $\neq$ 3 and IG $\neq$ 5, let IG = 4

If NPVOCA > 20 and $6 \leq$ NPPD ≤ 9 and IDCC = 0 and IDCIA = 0 let IG = 8

If NPVOCA > 20 and $6 \leq$ NPPD ≤ 9 and (IDCC = 1 or IDCIA = 1), let IG = 9

If NPVOCA > 20 and $6 \leq$ NPPD ≤ 9 and IG $\neq 8$ and IG $\neq 9$, let IG = 7

Otherwise, let IG = 0.

APPENDIX C

Appendix Table C.1 Definition of College Entrance Requirements.

Subject Area	Number of Semesters Required for Admission		
	Purdue	Northern Michigan	Harvard
English	6	6	6
Mathematics	4	6	6
Science	2	4	2
Social Studies	2	0*	2
Foreign Language	0	0	6

*All pupils satisfying Northern Michigan University's other course requirements for admission also completed at least two semesters of social studies. Therefore, the requirements for Purdue and Northern Michigan segment pupils into three completely ordered categories. However, there are some pupils who will satisfy Harvard's course entry requirements who will not satisfy North Michigan's, because of the descrepancy in science requirements.

Appendix D:

Base Data Tables

Appendix Table D.1.1 Hours of Instruction in Various Curricular Areas, by High School Program, White Males.

Area	Program			
	General	Academic	Vocational	Total
Science	2.43	3.57	1.98	2.89
Foreign Language	0.82	2.15	0.30	1.36
Social Studies	4.21	3.76	3.69	3.88
English	4.53	4.33	4.20	4.36
Mathematics	2.57	3.64	2.04	2.98
Industrial Arts	1.94	0.80	2.97	1.60
Commercial	1.47	0.88	1.25	1.14
Arts	1.41	0.97	0.59	1.03
Total Academic	19.38	20.08	17.01	19.23
Agriculture	0.35	0.10	0.71	0.30
Business	1.06	0.64	0.95	0.83
Distributive Education	0.10	0.03	0.35	0.11
Health Occupations	0.04	0.05	0.03	0.04
Home Economics	0.17	0.04	0.07	0.08
Trade or Industrial	1.22	0.41	3.58	1.31
Total Vocational	2.94	1.26	5.68	2.68
Total	22.32	21.34	22.69	21.91

Appendix Table D.1.2 Hours of Instruction in Various Curricular Areas, by High School Program, White Females.

Area	Program			
	General	Academic	Vocational	Total
Science	2.10	3.06	1.68	2.48
Foreign Language	0.92	2.58	0.66	1.63
Social Studies	4.03	3.70	3.58	3.75
English	4.46	4.33	4.18	4.33
Mathematics	2.01	3.08	1.64	2.42
Industrial Arts	0.20	0.12	0.16	0.15
Commercial	3.01	1.46	5.52	2.95
Arts	1.90	1.71	0.85	1.52
Total Academic	18.61	20.05	18.29	19.23
Agriculture	0.04	0.01	0.01	0.02
Business	2.33	1.05	4.71	2.33
Distributive Education	0.14	0.02	0.28	0.12
Health Occupations	0.08	0.08	0.14	0.10
Home Economics	1.51	0.52	1.08	0.93
Trade or Industrial	0.14	0.03	0.28	0.13
Total Vocational	4.22	1.72	6.50	3.63
Total	22.83	21.77	24.79	22.86

Appendix Table D.1.3 Hours of Instruction in Various Curricular Areas, by High School Program, Black Males.

Area	Program			
	General	Academic	Vocational	Total
Science	2.43	3.48	2.33	2.69
Foreign Language	0.55	2.06	0.25	0.86
Social Studies	4.05	3.92	3.67	3.92
English	4.47	4.59	4.21	4.43
Mathematics	2.67	3.59	2.32	2.83
Industrial Arts	1.58	0.76	1.41	1.33
Commercial	1.13	1.00	0.88	1.02
Arts	1.32	1.12	0.95	1.17
Total Academic	18.19	20.51	16.03	18.24
Agriculture	0.45	0.16	0.66	0.42
Business	0.88	0.72	0.62	0.76
Distributive Education	0.14	0.01	0.37	0.18
Health Occupations	0.12	0.04	0.06	0.08
Home Economics	0.17	0.06	0.23	0.15
Trade or Industrial	1.05	0.42	3.07	1.43
Total Vocational	2.81	1.40	5.01	3.02
Total	21.00	21.91	21.04	21.26

Appendix Table D.1.4 Hours of Instruction in Various Curricular Areas, by High School Program, Black Females.

Area	Program			
	General	Academic	Vocational	Total
Science	2.23	3.21	2.10	2.51
Foreign Language	0.72	2.34	0.55	1.14
Social Studies	4.00	3.71	3.70	3.84
English	4.59	4.42	4.23	4.46
Mathematics	2.55	3.36	2.06	2.66
Industrial Arts	0.25	0.22	0.21	0.22
Commercial	2.26	1.46	3.88	2.47
Arts	1.08	1.39	0.94	1.15
Total Academic	17.68	20.12	17.66	18.41
Agriculture	0.03	0.00	0.00	0.01
Business	1.70	1.22	3.86	2.09
Distributive Education	0.19	0.01	0.44	0.21
Health Occupations	0.18	0.34	0.27	0.29
Home Economics	1.46	0.65	1.17	1.14
Trade or Industrial	0.11	0.07	0.67	0.24
Total Vocational	3.67	2.29	6.41	4.00
Total	21.35	22.41	24.07	22.41